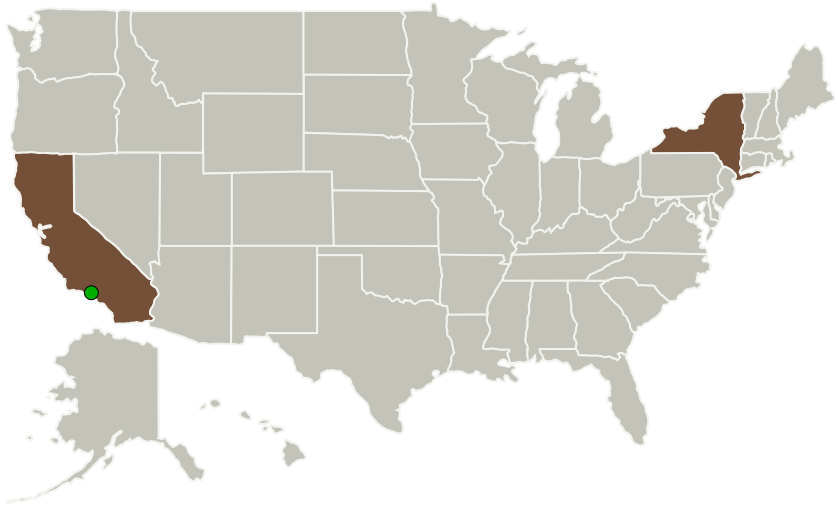
Pyramid Comet Sampler, Phase I

Completed Technology Project (2014 - 2014)

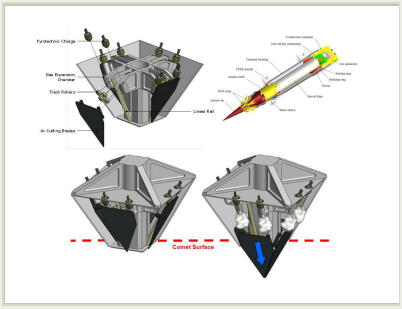
Project Introduction

Based on the sampling requirements, we propose an Inverted Pyramid sampling system. Each face of the pyramid includes a cutting blade which is independently actuated by redundant pyrotechnic actuators. Such sampler shape has a number of advantages. The pyramidal V shape acts as an arrow piercing into the comet surface at a steep angle. The 4 opposing blades offset tangential forces, meaning that only vertical forces would need to be reacted during impact. These forces could be minimized by making the pyramid height low (and in turn the pyramid would be more flat). In the latest Decadal Survey, the committee recommended selecting a Comet Surface Sample Return mission as one of the five New Frontiers 4 (NF4) missions, solidifying the importance of studying returned physical samples from a comet. Lunar South Pole-Aitken Basin Sample Return could also benefit from the development of this sampling approach.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California



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Primary U.S. Work Locations	
California	New York

Project Transitions

June 2014: Project Start

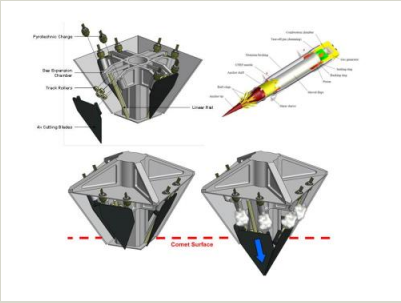
December 2014: Closed out

Closeout Summary: Pyramid Comet Sampler, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/140602)*

Images



Briefing Chart Image
Pyramid Comet Sampler, Phase I
(https://techport.nasa.gov/image/137043)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Honeybee Robotics, Ltd.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Kris Zacny

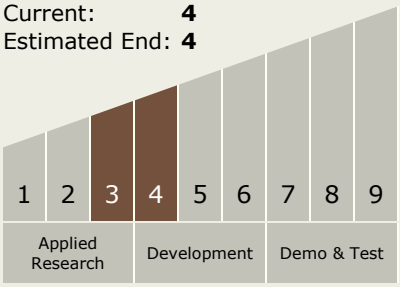
Co-Investigator:
Kris Zacny

Pyramid Comet Sampler, Phase I

Completed Technology Project (2014 - 2014)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.2 Grappling Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System